

CLAIMS

What is claimed is:

- 1 1. A method of optimizing production in a well,
2 comprising:
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4 operating a gas lift system in a wellbore;
5
6 gathering a plurality of production related
7 parameters;
8
9 matching a well model with measured data obtained
10 from the production related parameters to determine
11 discrepancies; and
12
13 redesigning the gas lift system based on the
14 discrepancies.
- 1 2. The method as recited in claim 1, wherein gathering
2 comprises measuring the gas injection rate.
- 1 3. The method as recited in claim 1, wherein gathering
2 comprises measuring the fluid production rate.
- 1 4. The method recited in claim 1, wherein gathering
2 comprises obtaining a flowing gradient survey.
- 1 5. The method as recited in claim 1, wherein gathering
2 comprises obtaining temperature data.

- 1 6. The method as recited in claim 1, wherein gathering
2 comprises obtaining temperature data.
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- 4 7. The method as recited in claim 6, wherein the
5 temperature data is obtained via a distributed
6 temperature sensing system.
- 1 8. The method as recited in claim 1, wherein gathering
2 comprises obtaining surface parameter measurements.
- 1 9. The method recited in claim 1, wherein gathering
2 comprises obtaining downhole parameter measurements.
- 1 10. The method as recited in claim 1, wherein gathering
2 comprises obtaining episodic measurements.
- 1 11. The method as recited in claim 1, wherein gathering
2 comprises measuring a tubing pressure.
- 1 12. The method as recited in claim 1, wherein gathering
2 comprises measuring a tubing temperature.
- 1 13. The method as recited in claim 1, wherein gathering
2 comprises measuring an injection pressure.
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- 1 14. The method as recited in claim 1, wherein gathering
2 comprises measuring an injection temperature.
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- 1 15. The method as recited in claim 1, wherein gathering
2 comprises utilizing a multiphase flow meter.
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- 1 16. The method as recited in claim 1, wherein gathering
2 comprises measuring a tubing pressure below a gas lift
3 orifice.
- 1 17. The method as recited in claim 1, wherein gathering
2 comprises measuring a casing pressure below a gas lift
3 orifice.
- 1 18. The method as recited in claim 1, wherein gathering
2 comprises measuring temperature via a slickline
3 deployed distributed temperature sensing system.
- 1 19. The method recited in claim 1, further comprising
2 initially selecting a candidate well by obtaining well
3 test data.
- 1 20. The method as recited in claim 1, further comprising
2 initially selecting a candidate well by obtaining gas
3 lift monitoring data.
- 1 21. The method as recited in claim 1, further comprising
2 initially selecting a candidate well by obtaining well
3 history data.
- 1 22. The method as recited in claim 1, further comprising
2 initially selecting a candidate well by obtaining
3 completion specific data.

- 1 23. The method as recited in claim 1, further comprising
2 validating any improvements in production following
3 redesign of the gas lift system.
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- 1 24. The method as recited in claim 1, wherein matching
2 comprises analyzing inflow factors.
- 1 25. The method as recited in claim 1, wherein matching
2 comprises analyzing outflow factors.
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- 1 26. The method as recited in claim 1, wherein matching
2 comprises analyzing surface factors.
- 1 27. The method as recited in claim 1, wherein redesigning
2 comprises adjusting a temperature setting.
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- 1 28. The method as recited in claim 1, wherein redesigning
2 comprises adjusting a gas injection rate.
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- 1 29. The method as recited in claim 1, wherein redesigning
2 comprises changing a component of the gas lift system.
- 1 30. The method as recited in claim 1, wherein redesigning
2 comprises correcting an inlet related limitation.
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- 1 31. The method as recited in claim 1, wherein redesigning
2 comprises correcting an outlet related limitation.
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- 1 32. The method as recited in claim 1, wherein redesigning
2 comprises correcting a downhole related limitation.
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1 33. A system for optimizing production in a well,
2 comprising:

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4 a gas lift system positioned in the well;

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6 a sensor system to sense a plurality of well
7 related parameters; and

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9 a well modeling module able to automatically
10 compare a calculated model of the well to measured
11 data based on the plurality of well related parameters
12 to determine factors detrimentally affecting
13 optimization of production from the well.

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1 34. The system as recited in claim 33, wherein the sensor
2 system monitors data in real-time.

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1 35. The system as recited in claim 33, wherein the sensor
2 system comprises a remote processor system.

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1 36. The system as recited in claim 33, wherein the sensor
2 system is configured to sense a quantity of injected
3 gas.

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1 37. The system as recited in claim 33, wherein the sensor
2 system comprises a tubing pressure sensor and tubing
3 temperature sensor.

1 38. The system as recited in claim 33, wherein the sensor
2 system comprises an injection pressure sensor and an
3 injection temperature sensor.

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1 39. The system as recited in claim 33, further comprising
2 a multiphase flow data sensor.

1 40. The system as recited in claim 33, further comprising
2 an episodic sensor system.

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1 41. The system as recited in claim 40, wherein the
2 episodic sensor system is configured to obtain a
3 flowing gradient survey.

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1 42. The system as recited in claim 40, wherein the
2 episodic sensor system is configured to obtain a
3 distributed temperature profile.

1 43. A method of optimizing production from a gas lift
2 system disposed in a well, comprising:

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4 flowing a gas through the gas lift system;

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6 obtaining measured data from a plurality of
7 sensors positioned to sense production related
8 parameters;

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10 graphically plotting a gradient based on the
11 measured data;

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13 graphically plotting a model gradient; and

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15 comparing the gradient and the model gradient to
16 determine whether production can be optimized.

- 1 44. The method as recited in claim 43, further comprising
2 optimizing production performance of the gas lift
3 system.
- 1 45. The method as recited in claim 44, further comprising
2 adjusting the gas lift system to optimize performance.
- 1 46. The method as recited in claim 45, wherein adjusting
2 comprises correcting an inlet related limitation on
3 production.
- 1 47. The method as recited in claim 45, wherein adjusting
2 comprises correcting an outlet related limitation on
3 production.
- 1 48. The method as recited in claim 45, wherein adjusting
2 comprises correcting a downhole related limitation on
3 production.
- 1 49. The method as recited in claim 45, wherein adjusting
2 comprises adjusting a temperature setting.
- 1 50. The method as recited in claim 45, wherein adjusting
2 comprises adjusting a gas injection rate.
- 1 51. The method as recited in claim 45, wherein adjusting
2 comprises changing a component of the gas lift system.
- 1 52. The method as recited in claim 45, wherein adjusting
2 comprises adjusting a choke size.

1 53. The method as recited in claim 45, wherein adjusting
2 comprises adjusting a casing pressure.

1 54. The method as recited in claim 45, wherein adjusting
2 comprises adjusting a separator operating pressure.

1 55. The method as recited in claim 45, wherein adjusting
2 comprises removing a valve restriction.

1 56. The method as recited in claim 45, wherein adjusting
2 comprises fixing a tubing hole.

1 57. The method as recited in claim 45, wherein adjusting
2 comprises changing a valve spacing.